Time Series

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R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see http://rmarkdown.rstudio.com.

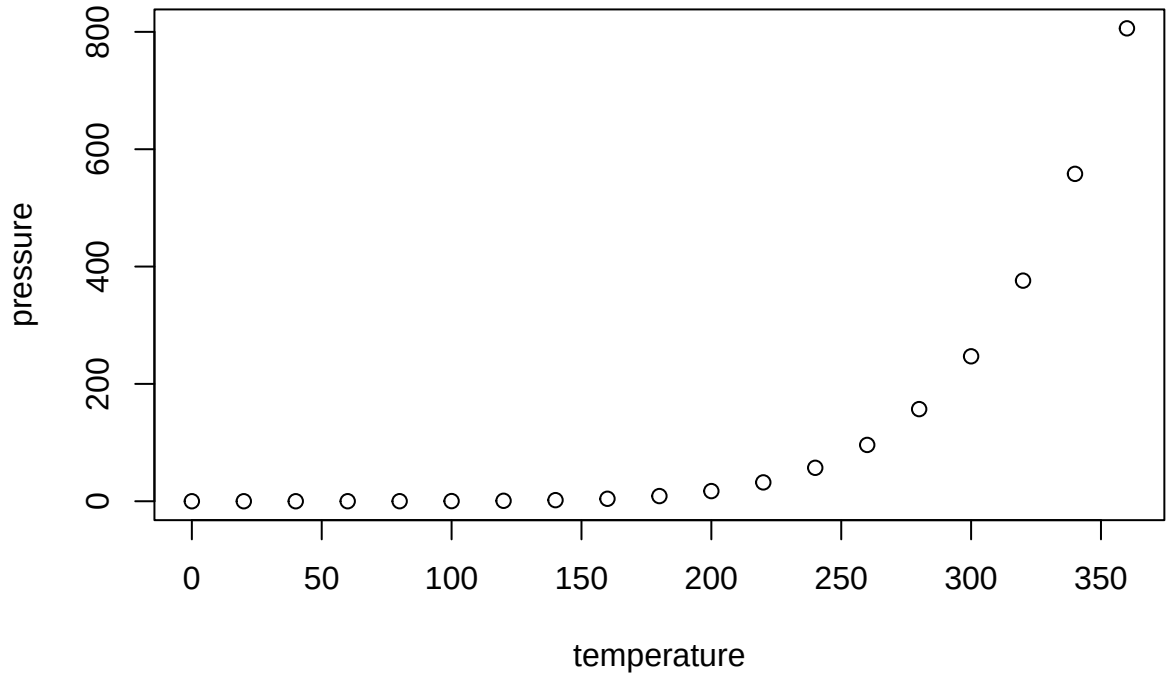
When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
summary(cars)
```

```
##      speed           dist       
##  Min.   : 4.0   Min.   :  2.00  
##  1st Qu.:12.0   1st Qu.: 26.00  
##  Median :15.0   Median : 36.00  
##  Mean   :15.4   Mean   : 42.98  
##  3rd Qu.:19.0   3rd Qu.: 56.00  
##  Max.   :25.0   Max.   :120.00
```

Including Plots

You can also embed plots, for example:



Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.

```
getwd()
```

```
## [1] "/home/guest/R/Patton_Guimond_ENV872_Final_Project"
```

```
#load packages
library(tidyverse)
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.2 --
## v ggplot2 3.3.6      v purrr   0.3.4
## v tibble  3.1.8      v dplyr   1.0.10
## v tidyr   1.2.0      v stringr 1.4.1
## v readr   2.1.2      v forcats 0.5.2
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
library(lubridate)
```

```
##
## Attaching package: 'lubridate'
##
```

```
## The following objects are masked from 'package:base':
##
##     date, intersect, setdiff, union
```

```
library(zoo)
```

```
##
## Attaching package: 'zoo'
##
## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric
```

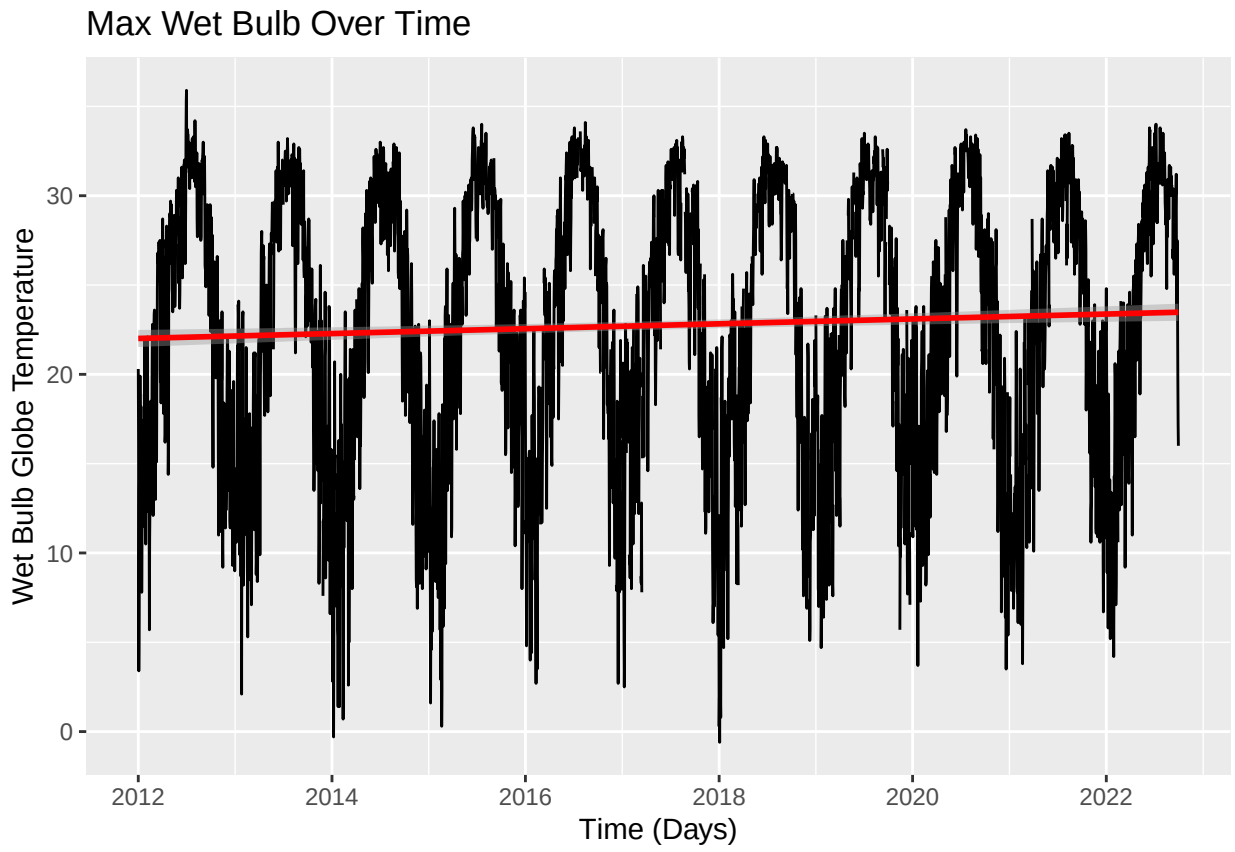
```
library(ggplot2)
library(trend)
library(Kendall)
library(tseries)
```

```
## Registered S3 method overwritten by 'quantmod':
##   method            from
##   as.zoo.data.frame zoo
```

```
library(dplyr)

#Load Jackson Data
Jackson_Raw <- read.csv("~/R/Patton_Guimond_ENV872_Final_Project/Jackson_TenYear.csv",
                        stringsAsFactors = TRUE)
Jackson_Wrangle <- Jackson_Raw %>%
  select(YEAR, MO, DAY, WBGTC) %>%
  mutate('date' = make_date(year = YEAR, month = MO, day = DAY))

#Set as date
Jackson_Wrangle$date <- as.Date(Jackson_Wrangle$date, format = "%y/%m/%d")

#Group by date and find max daily temperature
Daily_High <- Jackson_Wrangle %>%
  group_by(date) %>%
  dplyr::summarize(value = max (WBGTC)) %>%
  as.data.frame()
#Plot max temperatures over time
MaxWBTG_Plot <- ggplot(Daily_High, aes(x = date, y = value)) +
  geom_line()+
  geom_smooth(method=lm, col= 'red')+
 ggtitle("Max Wet Bulb Over Time")+
  xlab("Time (Days)") + ylab("Wet Bulb Globe Temperature")
print(MaxWBTG_Plot)
```

```
## `geom_smooth()` using formula 'y ~ x'
```

```
## Warning: Removed 125 rows containing non-finite values (stat_smooth).
```




```
#Look for NA values in data and remove
summary(Daily_High$value)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##   -0.60   17.20   23.80   22.74   29.50   35.90     125
```

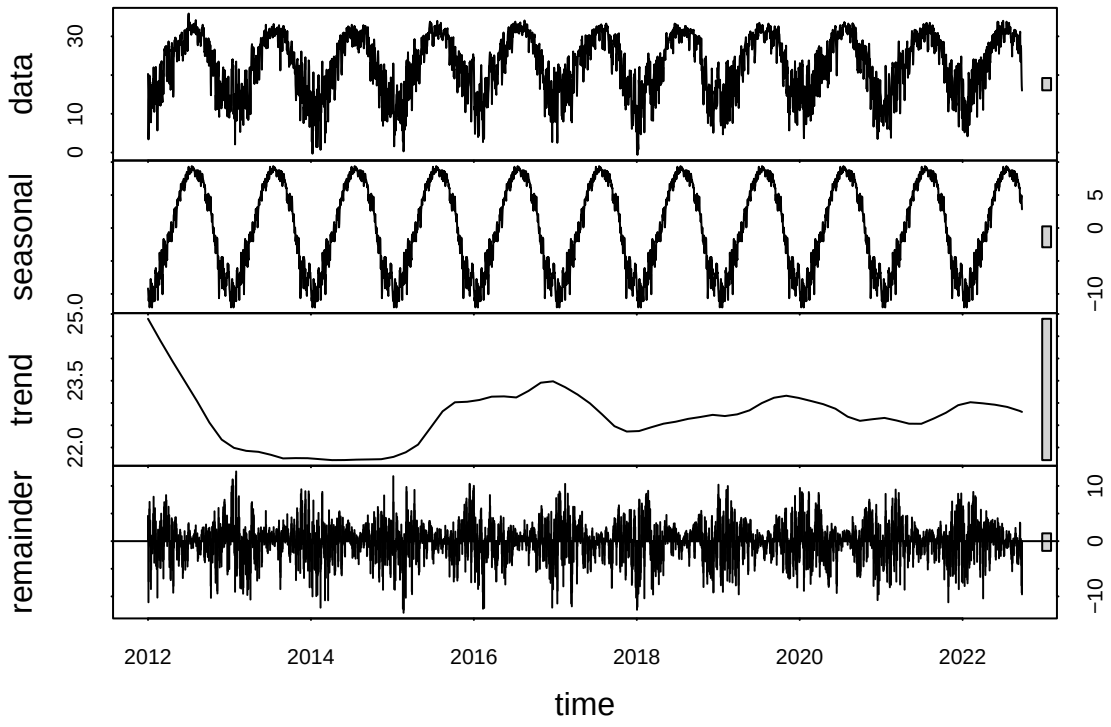
```
Clean_WetBulb <-
  Daily_High %>%
  mutate(WBGTC_Clean = zoo::na.approx(value))
summary(Clean_WetBulb)
```

```
##       date                value         WBGTC_Clean
##  Min.   :2012-01-01   Min.   :-0.60   Min.   :-0.60
##  1st Qu.:2014-09-06   1st Qu.:17.20   1st Qu.:17.20
##  Median :2017-05-13   Median :23.80   Median :23.80
##  Mean   :2017-05-14   Mean   :22.74   Mean   :22.75
##  3rd Qu.:2020-01-19   3rd Qu.:29.50   3rd Qu.:29.50
##  Max.   :2022-09-30   Max.   :35.90   Max.   :35.90
##                       NA's   :125
```

```
#Filter for date and NA omitted Temp
Max_WetBulb <- Clean_WetBulb%>%
  select(date, WBGTC_Clean)
summary(Max_WetBulb)
```

```
##       date             WBGTC_Clean
##  Min.   :2012-01-01   Min.   :-0.60
##  1st Qu.:2014-09-06   1st Qu.:17.20
##  Median :2017-05-13   Median :23.80
##  Mean   :2017-05-14   Mean   :22.75
##  3rd Qu.:2020-01-19   3rd Qu.:29.50
##  Max.   :2022-09-30   Max.   :35.90
```

```
#Create Time series object and decompose

Daily_High_ts <- ts(Max_WetBulb$WBGTC_Clean, start = c(2012,01,01), frequency = 365)
Daily_High_decomp <- stl(Daily_High_ts,s.window = "periodic")
plot(Daily_High_decomp)
```




```
Daily_WetBulb_Trend <- Kendall::SeasonalMannKendall(Daily_High_ts)
summary(Daily_WetBulb_Trend)
```

```
## Score =  601 , Var(Score) = 56149
## denominator =  19016.47
## tau = 0.0316, 2-sided pvalue =0.011203
```

```
#Subtract seasonality and run seasonally adjusted Mann Kendall
Daily_Components <- as.data.frame(Daily_High_decomp$time.series[,1:3])
```

```
Daily_Components <- mutate(Daily_Components,
        WBGTC = Max_WetBulb$WBGTC_Clean,
        Date = Max_WetBulb$date)

WetBulb_SeasonAdj <- Daily_Components %>%
  mutate(Subtract.Season = Daily_Components$WBGTC - Daily_Components$seasonal)
summary(WetBulb_SeasonAdj)
```

```
##     seasonal             trend         remainder             WBGTC
##  Min.   :-12.05802   Min.   :21.72   Min.   :-12.96412   Min.   :-0.60
##  1st Qu.: -6.43466   1st Qu.:22.36   1st Qu.: -2.02813   1st Qu.:17.20
##  Median :  0.09436   Median :22.71   Median :  0.27878   Median :23.80
##  Mean   :  0.08434   Mean   :22.67   Mean   : -0.01004   Mean   :22.75
##  3rd Qu.:  6.69065   3rd Qu.:23.03   3rd Qu.:  2.06973   3rd Qu.:29.50
##  Max.   :  9.38170   Max.   :24.89   Max.   : 12.62108   Max.   :35.90
##       Date            Subtract.Season
##  Min.   :2012-01-01   Min.   : 8.91
##  1st Qu.:2014-09-06   1st Qu.:20.59
##  Median :2017-05-13   Median :22.92
##  Mean   :2017-05-14   Mean   :22.66
##  3rd Qu.:2020-01-19   3rd Qu.:24.73
##  Max.   :2022-09-30   Max.   :34.60
```

```
NonSeasonal_WetBulb_Trend <- Kendall::MannKendall(WetBulb_SeasonAdj$Subtract.Season)
summary(NonSeasonal_WetBulb_Trend)
```

```
## Score =  225369 , Var(Score) = 6680122368
## denominator =  7669408
## tau = 0.0294, 2-sided pvalue =0.0058262
```

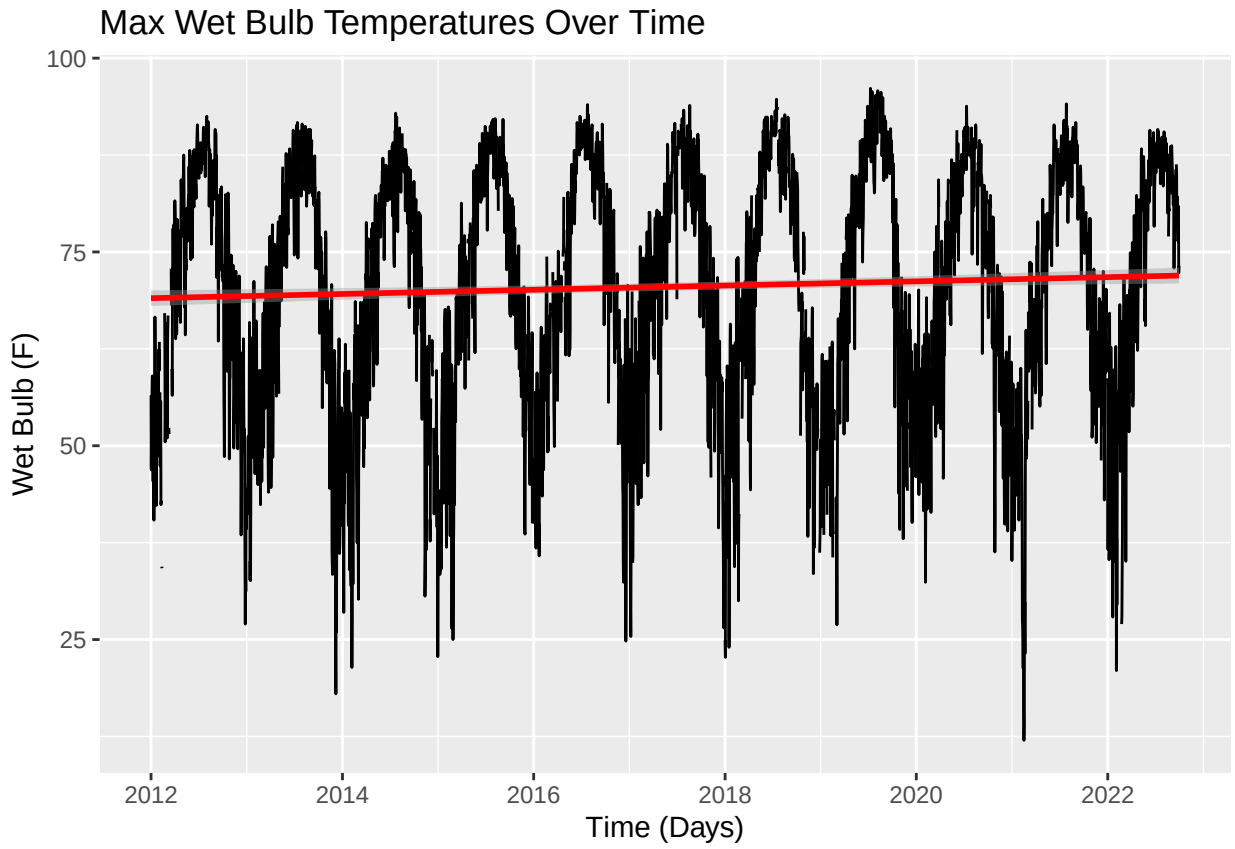
```
#Load Jackson Data
KFSI_Clean <- read.csv("~/R/Patton_Guimond_ENV872_Final_Project/KFSI_Clean.csv",
                       stringsAsFactors = TRUE)
KFSI_Wrangle <- KFSI_Clean %>%
  select(Year, Month, Day, Derived.Wet.Bulb.Globe.Temperature..F.) %>%
  mutate('date' = make_date(year = Year, month = Month, day = Day))

#Set as date
KFSI_Wrangle$date <- as.Date(KFSI_Wrangle$date, format = "%y/%m/%d")
KFSI_Wrangle_Update <- KFSI_Wrangle %>%
  select(date, Derived.Wet.Bulb.Globe.Temperature..F.)

#Group by date and find max daily temperature
Daily_High_KFSI <- KFSI_Wrangle_Update %>%
  group_by(date) %>%
  dplyr::summarize(value = max (Derived.Wet.Bulb.Globe.Temperature..F.)) %>%
  as.data.frame()
#Plot max temperatures over time
KFSI_Max_WetBulb_Plot <- ggplot(Daily_High_KFSI, aes(x = date, y = value)) +
  geom_line()+
  geom_smooth(method=lm, col= 'red')+
 ggtitle("Max Wet Bulb Temperatures Over Time")+
```

```
  xlab("Time (Days)") + ylab("Wet Bulb (F)")
print(KFSI_Max_WetBulb_Plot)
```

```
## `geom_smooth()` using formula 'y ~ x'
```

```
## Warning: Removed 187 rows containing non-finite values (stat_smooth).
```

```
## Warning: Removed 1 row(s) containing missing values (geom_path).
```




```
#Look for NA values in data and remove
summary(Daily_High_KFSI$value)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##   12.00   58.73   72.90   70.49   84.50   96.10     187
```

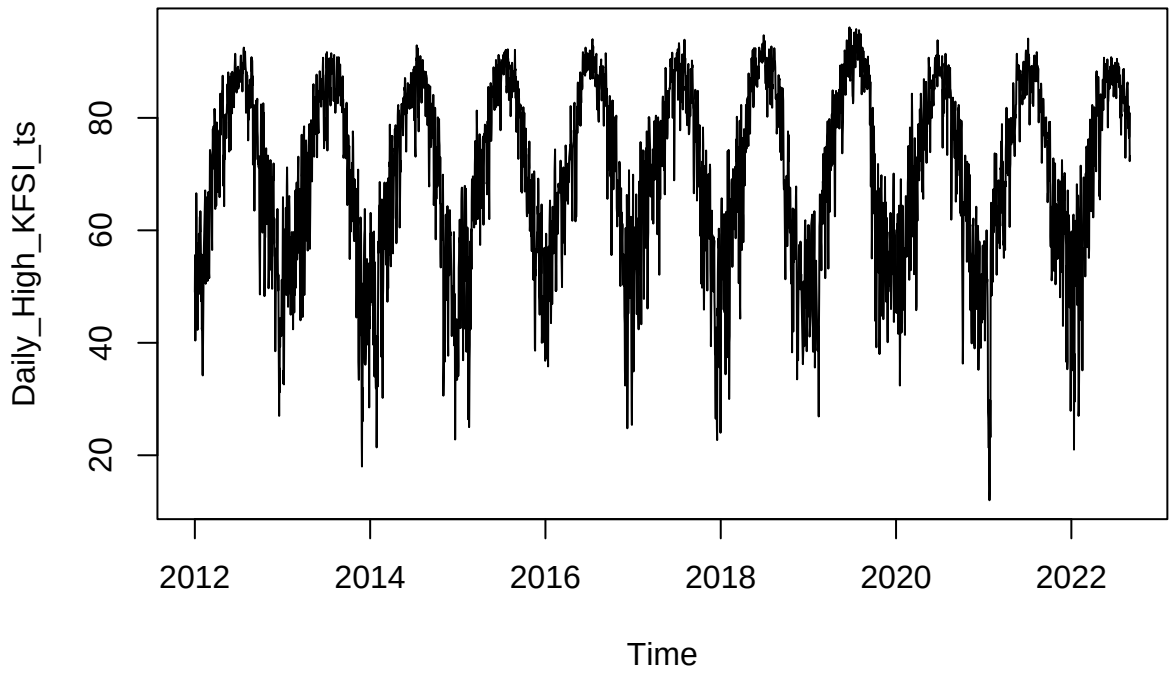
```
KFSI_Filtered_Date <- Daily_High_KFSI %>%
  filter(between(date, as.Date("2012-01-10"), as.Date("2022-09-30")))

Clean_Max_WetBulb_KSFI <-
  KFSI_Filtered_Date %>%
  mutate(Wet_Bulb = zoo::na.approx(value))
summary(Clean_Max_WetBulb_KSFI)
```

```
##       date                value          Wet_Bulb
##  Min.   :2012-01-10   Min.   :12.00   Min.   :12.0
##  1st Qu.:2014-09-10   1st Qu.:58.80   1st Qu.:58.6
##  Median :2017-05-13   Median :73.00   Median :72.6
##  Mean   :2017-05-17   Mean   :70.53   Mean   :70.3
##  3rd Qu.:2020-01-20   3rd Qu.:84.50   3rd Qu.:84.3
##  Max.   :2022-09-30   Max.   :96.10   Max.   :96.1
##                       NA's   :186
```

```
Clean_Max_WetBulb_KSFI <- Clean_Max_WetBulb_KSFI %>%
  select(date,Wet_Bulb)
summary(Clean_Max_WetBulb_KSFI)
```

```
##       date               Wet_Bulb
##  Min.   :2012-01-10   Min.   :12.0
##  1st Qu.:2014-09-10   1st Qu.:58.6
##  Median :2017-05-13   Median :72.6
##  Mean   :2017-05-17   Mean   :70.3
##  3rd Qu.:2020-01-20   3rd Qu.:84.3
##  Max.   :2022-09-30   Max.   :96.1
```

```
#Create Time series object and decompose

Daily_High_KFSI_ts <- ts(Clean_Max_WetBulb_KSFI$Wet_Bulb, start = c(2012,01,01), frequency = 365)
Daily_High_KFSI_decomp <- stl(Daily_High_KFSI_ts,s.window = "periodic")
plot(Daily_High_KFSI_ts)
```



```
Daily_Temp_Trend_KFSI <- Kendall::SeasonalMannKendall(Daily_High_KFSI_ts)
summary(Daily_Temp_Trend_KFSI)
```

```
## Score =  1106 , Var(Score) = 55324
## denominator =  18825.18
## tau = 0.0588, 2-sided pvalue =2.5741e-06
```

```
#Subtract seasonality and run seasonally adjusted Mann Kendall
Daily_Components_KFSI <- as.data.frame(Daily_High_KFSI_decomp$time.series[,1:3])

Daily_Components_KFSI <- mutate(Daily_Components_KFSI,
        Wet_Bulb_F = Clean_Max_WetBulb_KSFI$Wet_Bulb,
        Date = Clean_Max_WetBulb_KSFI$date)

TempSeasonAdj_KFSI <- Daily_Components_KFSI %>%
  mutate(Subtract.Season = Daily_Components_KFSI$Wet_Bulb_F - Daily_Components_KFSI$seasonal)
summary(TempSeasonAdj_KFSI)
```

```
##     seasonal            trend         remainder           Wet_Bulb_F
##  Min.   :-25.7657   Min.   :67.32   Min.   :-34.45664   Min.   :12.0
##  1st Qu.:-13.0419   1st Qu.:69.01   1st Qu.: -3.41231   1st Qu.:58.6
##  Median :  1.3529   Median :70.33   Median :  0.53595   Median :72.6
##  Mean   :  0.2568   Mean   :70.04   Mean   :  0.00451   Mean   :70.3
##  3rd Qu.: 14.4074   3rd Qu.:71.06   3rd Qu.:  4.16777   3rd Qu.:84.3
##  Max.   : 19.8934   Max.   :72.29   Max.   : 22.33340   Max.   :96.1
##       Date            Subtract.Season
##  Min.   :2012-01-10   Min.   :34.28
##  1st Qu.:2014-09-10   1st Qu.:66.52
##  Median :2017-05-13   Median :70.57
##  Mean   :2017-05-17   Mean   :70.04
##  3rd Qu.:2020-01-20   3rd Qu.:74.38
##  Max.   :2022-09-30   Max.   :94.32
```

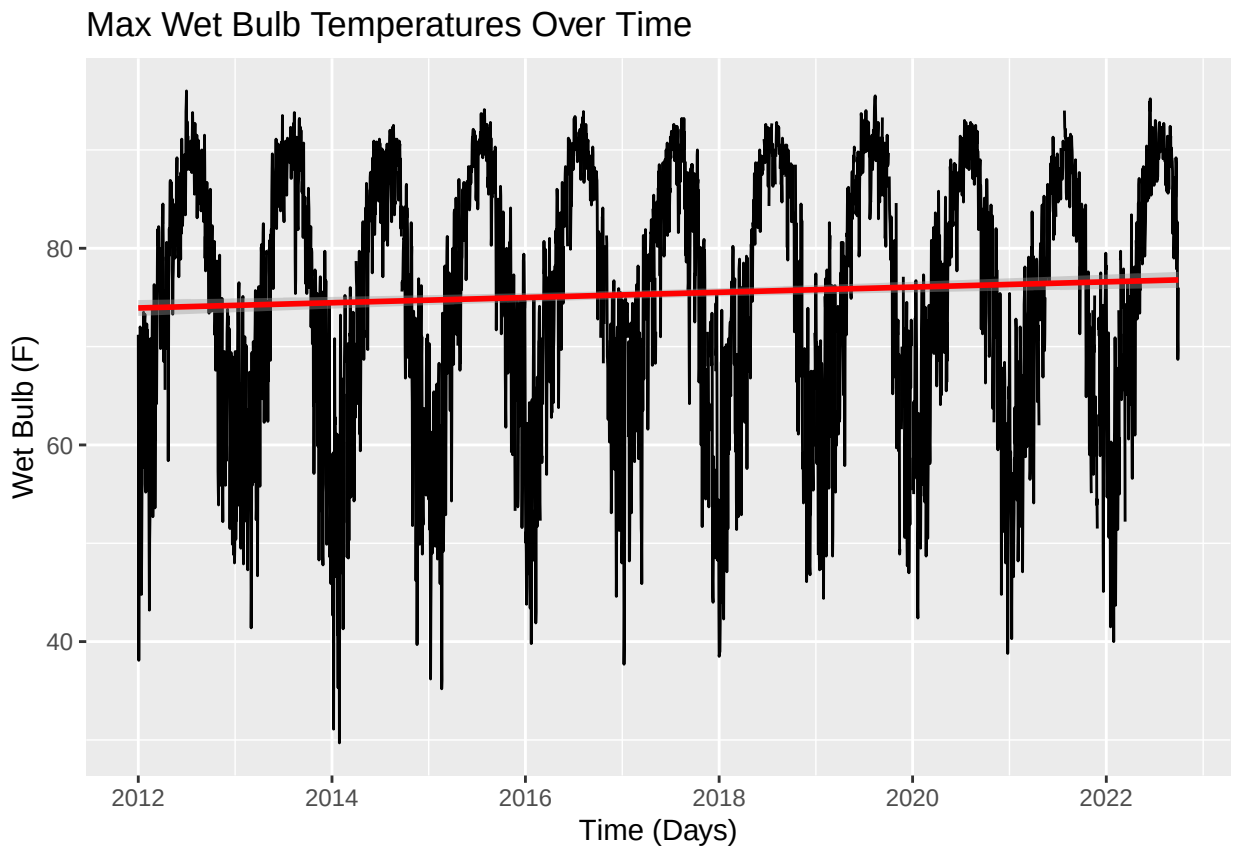
```
NonSeasonal_Temp_Trend_KFSI <- Kendall::MannKendall(TempSeasonAdj_KFSI$Subtract.Season)
summary(NonSeasonal_Temp_Trend_KFSI)
```

```
## Score =  306922 , Var(Score) = 6568209920
## denominator =  7583515
## tau = 0.0405, 2-sided pvalue =0.00015247
```

```
#Load Data
KLSF_Clean <- read.csv("~/R/Patton_Guimond_ENV872_Final_Project/KLSF_Clean.csv",
                       stringsAsFactors = TRUE)
KLSF_Wrangle <- KLSF_Clean %>%
  select(Year, Month, Day, Derived.Wet.Bulb.Globe.Temperature..F.) %>%
  mutate('date' = make_date(year = Year, month = Month, day = Day))


#Set as date
KLSF_Wrangle$date <- as.Date(KLSF_Wrangle$date, format = "%y/%m/%d")
KLSF_Wrangle_Update <- KLSF_Wrangle %>%
```

```
  select(date, Derived.Wet.Bulb.Globe.Temperature..F.)

#Group by date and find max daily temperature
Daily_High_KLSF <- KLSF_Wrangle_Update %>%
  group_by(date) %>%
  dplyr::summarize(value = max (Derived.Wet.Bulb.Globe.Temperature..F.)) %>%
  as.data.frame()
#Plot max temperatures over time
KLSF_Max_Wet_Bulb_Plot <- ggplot(Daily_High_KLSF, aes(x = date, y = value)) +
  geom_line()+
  geom_smooth(method=lm, col= 'red')+
 ggtitle("Max Wet Bulb Temperatures Over Time")+
  xlab("Time (Days)") + ylab("Wet Bulb (F)")
print(KLSF_Max_Wet_Bulb_Plot)
```

```
## `geom_smooth()` using formula 'y ~ x'

## Warning: Removed 95 rows containing non-finite values (stat_smooth).

## Warning: Removed 1 row(s) containing missing values (geom_path).
```




```
#Look for NA values in data and remove
summary(Daily_High_KLSF$value)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##   29.70   66.20   77.60   75.34   86.65   96.00      95
```

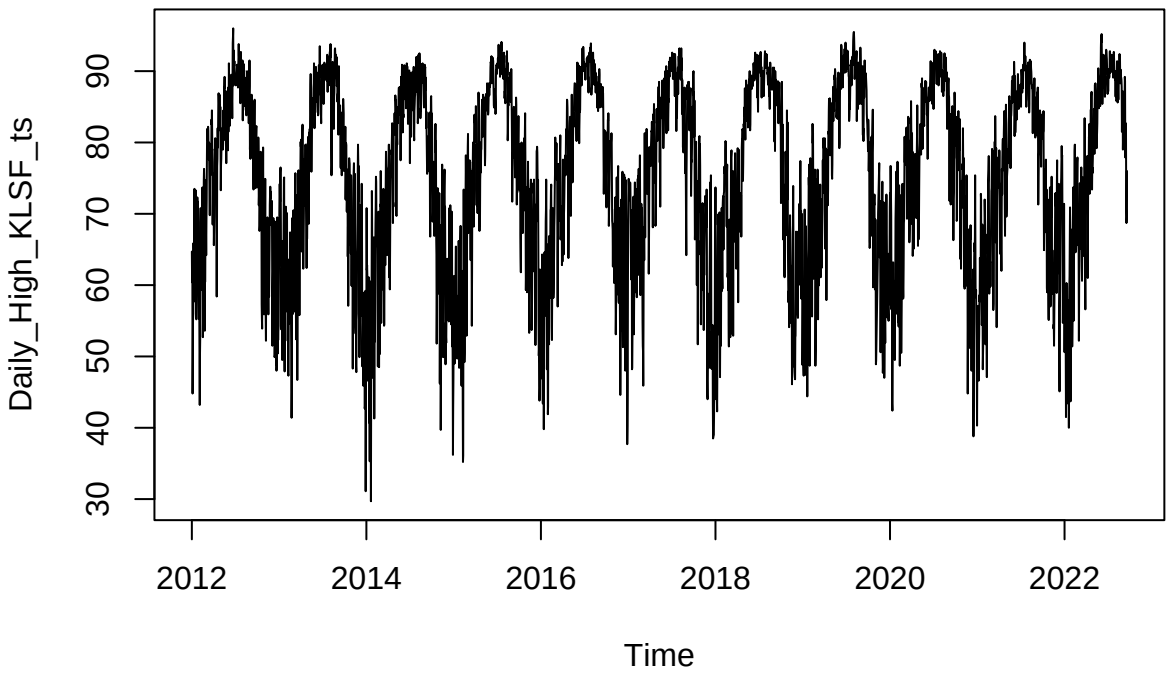
```
KLSF_Filtered_Date <- Daily_High_KLSF %>%
  filter(between(date, as.Date("2012-01-10"), as.Date("2022-09-30")))

Clean_Max_WetBulb_KLSF <-
  KLSF_Filtered_Date %>%
  mutate(Wet_Bulb = zoo::na.approx(value))
summary(Clean_Max_WetBulb_KLSF)
```

```
##       date                value          Wet_Bulb
##  Min.   :2012-01-10   Min.   :29.70   Min.   :29.7
##  1st Qu.:2014-09-15   1st Qu.:66.22   1st Qu.:66.2
##  Median :2017-05-21   Median :77.60   Median :77.4
##  Mean   :2017-05-20   Mean   :75.38   Mean   :75.3
##  3rd Qu.:2020-01-24   3rd Qu.:86.70   3rd Qu.:86.6
##  Max.   :2022-09-30   Max.   :96.00   Max.   :96.0
##                       NA's   :94
```

```
Clean_Max_WetBulb_KLSF <- Clean_Max_WetBulb_KLSF %>%
  select(date,Wet_Bulb)
summary(Clean_Max_WetBulb_KLSF)
```

```
##       date               Wet_Bulb
##  Min.   :2012-01-10   Min.   :29.7
##  1st Qu.:2014-09-15   1st Qu.:66.2
##  Median :2017-05-21   Median :77.4
##  Mean   :2017-05-20   Mean   :75.3
##  3rd Qu.:2020-01-24   3rd Qu.:86.6
##  Max.   :2022-09-30   Max.   :96.0
```

```
#Create Time series object and decompose

Daily_High_KLSF_ts <- ts(Clean_Max_WetBulb_KLSF$Wet_Bulb, start = c(2012,01,01), frequency = 365)
Daily_High_KLSF_decomp <- stl(Daily_High_KLSF_ts,s.window = "periodic")
plot(Daily_High_KLSF_ts)
```




```
Daily_Temp_Trend_KLSF <- Kendall::SeasonalMannKendall(Daily_High_KLSF_ts)
summary(Daily_Temp_Trend_KLSF)
```

```
## Score =  609 , Var(Score) = 55991.67
## denominator =  18988.64
## tau = 0.0321, 2-sided pvalue =0.010062
```

```
#Subtract seasonality and run seasonally adjusted Mann Kendall
Daily_Components_KLSF <- as.data.frame(Daily_High_KLSF_decomp$time.series[,1:3])

Daily_Components_KLSF <- mutate(Daily_Components_KLSF,
        Wet_Bulb = Clean_Max_WetBulb_KLSF$Wet_Bulb,
        Date = Clean_Max_WetBulb_KLSF$date)

TempSeasonAdj_KLSF <- Daily_Components_KLSF %>%
  mutate(Subtract.Season = Daily_Components_KLSF$Wet_Bulb - Daily_Components_KLSF$seasonal)
summary(TempSeasonAdj_KLSF)
```

```
##     seasonal             trend         remainder           Wet_Bulb
##  Min.   :-23.92826   Min.   :73.38   Min.   :-25.75377   Min.   :29.7
##  1st Qu.:-10.43679   1st Qu.:74.39   1st Qu.: -3.40536   1st Qu.:66.2
##  Median :  0.03123   Median :75.30   Median :  0.40802   Median :77.4
##  Mean   :  0.20194   Mean   :75.11   Mean   : -0.01792   Mean   :75.3
##  3rd Qu.: 11.47974   3rd Qu.:75.75   3rd Qu.:  3.59139   3rd Qu.:86.6
##  Max.   : 15.98621   Max.   :77.75   Max.   : 22.59372   Max.   :96.0
```

```
##       Date            Subtract.Season
##  Min.   :2012-01-10   Min.   :48.63
##  1st Qu.:2014-09-15   1st Qu.:71.68
##  Median :2017-05-21   Median :75.54
##  Mean   :2017-05-20   Mean   :75.09
##  3rd Qu.:2020-01-24   3rd Qu.:78.77
##  Max.   :2022-09-30   Max.   :96.47
```

```
NonSeasonal_Temp_Trend_KLSF <- Kendall::MannKendall(TempSeasonAdj_KLSF$Subtract.Season)
summary(NonSeasonal_Temp_Trend_KLSF)
```

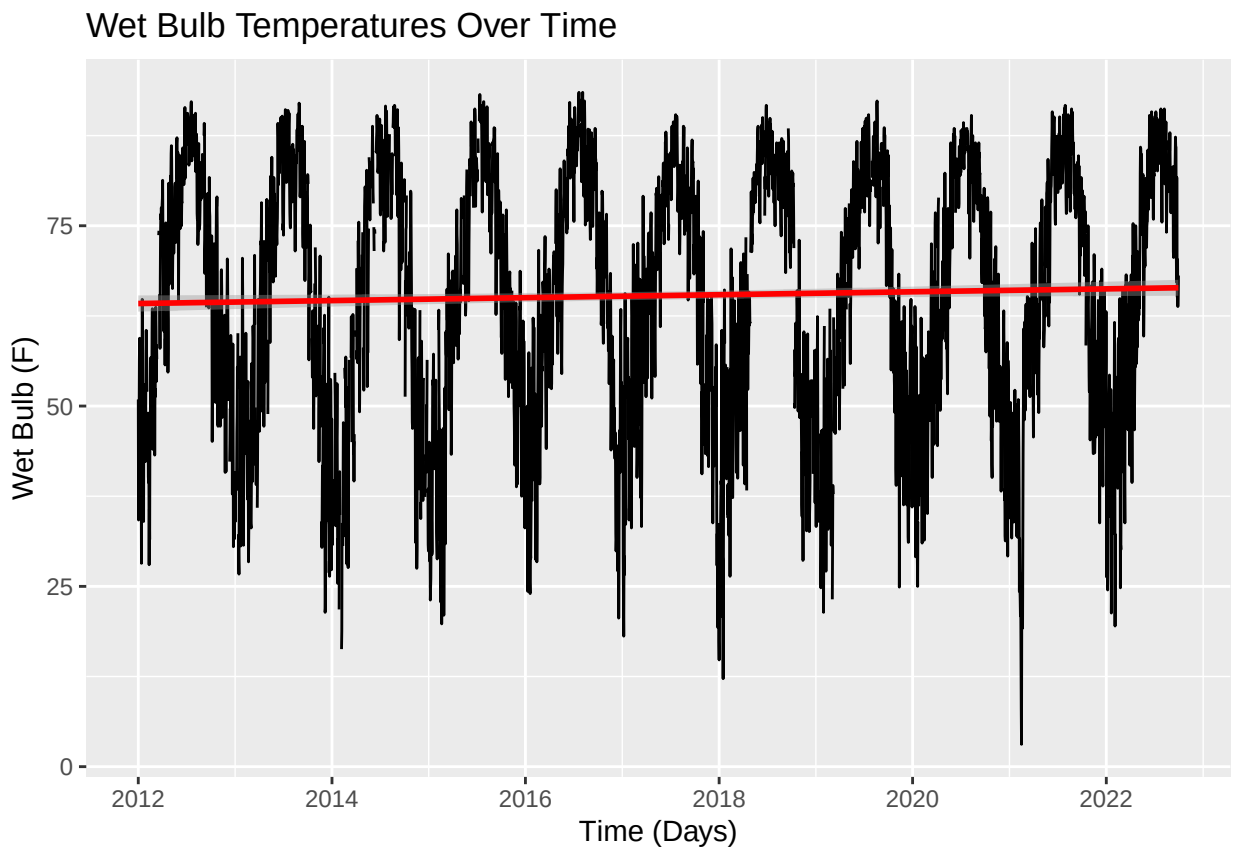
```
## Score =  185144 , Var(Score) = 6654576640
## denominator =  7649859
## tau = 0.0242, 2-sided pvalue =0.023233
```

```
#Load Data
KTBN_Clean <- read.csv("~/R/Patton_Guimond_ENV872_Final_Project/KTBN_Clean.csv",
                       stringsAsFactors = TRUE)
KTBN_Wrangle <- KTBN_Clean %>%
  select(Year, Month, Day, Derived.Wet.Bulb.Globe.Temperature..F.) %>%
  mutate('date' = make_date(year = Year, month = Month, day = Day))

#Set as date
KTBN_Wrangle$date <- as.Date(KTBN_Wrangle$date, format = "%y/%m/%d")
KTBN_Wrangle_Update <- KTBN_Wrangle %>%
  select(date, Derived.Wet.Bulb.Globe.Temperature..F.)

#Group by date and find max daily temperature
Daily_High_KTBN <- KTBN_Wrangle_Update %>%
  group_by(date) %>%
  dplyr::summarize(value = max (Derived.Wet.Bulb.Globe.Temperature..F.)) %>%
  as.data.frame()
#Plot max temperatures over time
KTBN_Max_WetBulb_Plot <- ggplot(Daily_High_KTBN, aes(x = date, y = value)) +
  geom_line()+
  geom_smooth(method=lm, col= 'red')+
 ggtitle("Wet Bulb Temperatures Over Time")+
  xlab("Time (Days)") + ylab("Wet Bulb (F)")
print(KTBN_Max_WetBulb_Plot)
```

```
## `geom_smooth()` using formula 'y ~ x'
```

```
## Warning: Removed 163 rows containing non-finite values (stat_smooth).
```

```
## Warning: Removed 1 row(s) containing missing values (geom_path).
```




```
#Look for NA values in data and remove
summary(Daily_High_KTBN$value)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    3.10   52.40   67.10   65.32   80.80   93.50     163
```

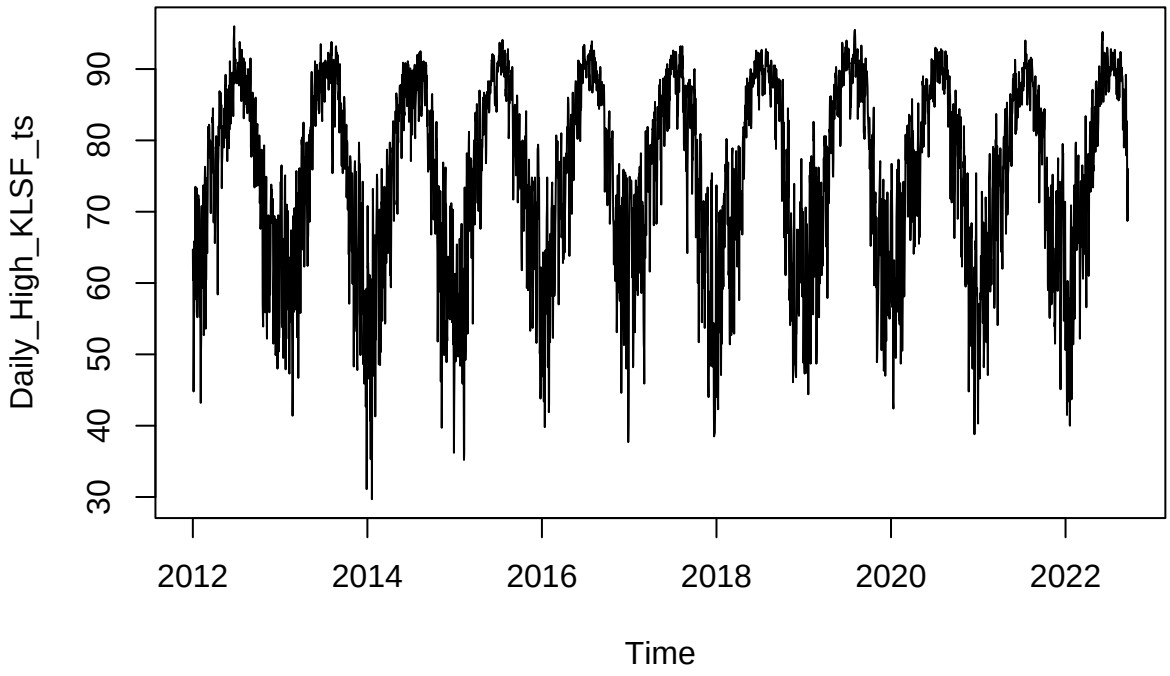
```
KTBN_Filtered_Date <- Daily_High_KTBN %>%
  filter(between(date, as.Date("2012-01-10"), as.Date("2022-09-30")))

Clean_Max_WetBulb_KTBN <-
  KTBN_Filtered_Date %>%
  mutate(Wet_Bulb = zoo::na.approx(value))
summary(Clean_Max_WetBulb_KTBN)
```

```
##       date                value          Wet_Bulb
##  Min.   :2012-01-10   Min.   : 3.10   Min.   : 3.10
##  1st Qu.:2014-09-16   1st Qu.:52.40   1st Qu.:52.20
##  Median :2017-05-21   Median :67.20   Median :67.03
##  Mean   :2017-05-21   Mean   :65.36   Mean   :65.21
##  3rd Qu.:2020-01-25   3rd Qu.:80.90   3rd Qu.:80.60
##  Max.   :2022-09-30   Max.   :93.50   Max.   :93.50
##                       NA's   :162
```

```
Clean_Max_WetBulb_KTBN <- Clean_Max_WetBulb_KTBN %>%
    select(date,Wet_Bulb)
summary(Clean_Max_WetBulb_KTBN)
```

```
##       date               Wet_Bulb
##  Min.   :2012-01-10   Min.   : 3.10
##  1st Qu.:2014-09-16   1st Qu.:52.20
##  Median :2017-05-21   Median :67.03
##  Mean   :2017-05-21   Mean   :65.21
##  3rd Qu.:2020-01-25   3rd Qu.:80.60
##  Max.   :2022-09-30   Max.   :93.50
```

```
#Create Time series object and decompose

Daily_High_KLSF_ts <- ts(Clean_Max_WetBulb_KLSF$Wet_Bulb, start = c(2012,01,01), frequency = 365)
Daily_High_KLSF_decomp <- stl(Daily_High_KLSF_ts,s.window = "periodic")
plot(Daily_High_KLSF_ts)
```




```
Daily_WetBulb_Trend_KLSF <- Kendall::SeasonalMannKendall(Daily_High_KLSF_ts)
summary(Daily_WetBulb_Trend_KLSF)
```

```
## Score =  609 , Var(Score) = 55991.67
## denominator =  18988.64
## tau = 0.0321, 2-sided pvalue =0.010062
```

```r
#Subtract seasonality and run seasonally adjusted Mann Kendall
Daily_Components_KLSF <- as.data.frame(Daily_High_KLSF_decomp$time.series[,1:3])

Daily_Components_KLSF <- mutate(Daily_Components_KLSF,
        Wet_Bulb = Clean_Max_WetBulb_KLSF$Wet_Bulb,
        Date = Clean_Max_WetBulb_KLSF$date)

TempSeasonAdj_KLSF <- Daily_Components_KLSF %>%
  mutate(Subtract.Season = Daily_Components_KLSF$Wet_Bulb - Daily_Components_KLSF$seasonal)
summary(TempSeasonAdj_KLSF)
```

```
##     seasonal             trend         remainder            Wet_Bulb
##  Min.   :-23.92826   Min.   :73.38   Min.   :-25.75377   Min.   :29.7
##  1st Qu.:-10.43679   1st Qu.:74.39   1st Qu.: -3.40536   1st Qu.:66.2
##  Median :  0.03123   Median :75.30   Median :  0.40802   Median :77.4
##  Mean   :  0.20194   Mean   :75.11   Mean   : -0.01792   Mean   :75.3
##  3rd Qu.: 11.47974   3rd Qu.:75.75   3rd Qu.:  3.59139   3rd Qu.:86.6
##  Max.   : 15.98621   Max.   :77.75   Max.   : 22.59372   Max.   :96.0
##       Date            Subtract.Season
##  Min.   :2012-01-10   Min.   :48.63
##  1st Qu.:2014-09-15   1st Qu.:71.68
##  Median :2017-05-21   Median :75.54
##  Mean   :2017-05-20   Mean   :75.09
##  3rd Qu.:2020-01-24   3rd Qu.:78.77
##  Max.   :2022-09-30   Max.   :96.47
```

```r
NonSeasonal_Wet_Bulb_Trend_KLSF <- Kendall::MannKendall(TempSeasonAdj_KLSF$Subtract.Season)
summary(NonSeasonal_Wet_Bulb_Trend_KLSF)
```

```
## Score =  185144 , Var(Score) = 6654576640
## denominator =  7649859
## tau = 0.0242, 2-sided pvalue =0.023233
```